CLAIMS

1. A homogeneous liquid low molecular weight ethylene/alpha-olefin polymer having;

   a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 25,000;

   b) a total crystallinity, as measured by DSC, of less than 10%; and

   c) a pour point as measured by ASTM D97 of less than 50°C.

2. The homogeneous liquid low molecular weight ethylene/alpha-olefin polymer of Claim 1, wherein said polymer is a copolymer of ethylene and at least one comonomer selected from the group consisting of ethylenically unsaturated monomers, conjugated or nonconjugated dienes, and polyenes, and has;

   a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 15,000;

   b) a comonomer incorporation of greater than 15 mol percent;

   c) a total crystallinity, as measured by DSC, of less than 7%; and

   c) a pour point as measured by ASTM D97 of less than 40°C.

3. The homogeneous liquid low molecular weight ethylene/alpha-olefin polymer of Claim 1, wherein said comonomer is an ethylenically unsaturated monomer selected from the group consisting of the C_3-C_{20} α-olefins, styrene, alkyl-substituted styrene, vinylbenzocyclobutane, 1,4-hexadiene, and naphthenics, and has;

   a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 11,000;

   b) a comonomer incorporation of greater than 30 mol percent;

   c) a total crystallinity, as measured by DSC, of less than 5%; and

   d) a pour point as measured by ASTM D97 of less than 25°C.

4. The homogeneous liquid low molecular weight ethylene/alpha-olefin polymer of Claim 1, wherein the comonomer is an ethylenically unsaturated monomer which is a C_3-C_{20} α-olefin, and wherein the α-olefin is further selected from the group consisting of 1-propene, isobutylene, 1-butene, 1-hexene, 1-heptene, 4-methyl-1-pentene, and 1-octene; and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 9,000;
b) a comonomer incorporation of greater than 40 mol percent;
c) a total crystallinity, as measured by DSC, of less than 2%; and
d) a pour point as measured by ASTM D97 of less than 15°C.

5. The homogeneous liquid low molecular weight ethylene/alpha-olefin polymers of Claim 4, wherein the comonomer is an ethylenically unsaturated is selected from the group consisting of propylene and 1-octene; and has;

a) a comonomer incorporation of greater than 50 mol percent; and
b) a pour point as measured by ASTM D97 of less than 0°C.

6. A process comprising reacting ethylene and at least one ethylenically unsaturated comonomer at a reaction temperature of at least 80°C in the absence of hydrogen and in the presence of a single site catalyst to form a homogeneous liquid low molecular weight ethylene/alpha-olefin polymer having;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 25,000;
b) a comonomer content of greater than 15 mol percent;
c) a total crystallinity, as measured by DSC, of less than 10%; and
d) a pour point as measured by ASTM D97 of less than 50°C.

7. A pour-point reducing additive comprising a homogeneous liquid low molecular weight ethylene/alpha-olefin polymer having;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 25,000;
b) a total crystallinity, as measured by DSC, of less than 10%; and
c) a pour point as measured by ASTM D97 of less than 50°C.

8. The pour-point reducing additive of Claim 7 wherein said homogeneous liquid low molecular weight ethylene/alpha-olefin polymer is a copolymer of ethylene and at least one comonomer selected from the group consisting of ethylenically unsaturated monomers, conjugated or nonconjugated dienes, and polyenes, and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 15,000;
b) a comonomer incorporation of greater than 15 mol percent;
c) a total crystallinity, as measured by DSC, of less than 7%; and
c) a pour point as measured by ASTM D97 of less than 40°C.

9. The pour-point reducing additive of Claim 7 wherein said homogeneous liquid low molecular weight ethylene/alpha-olefin polymer is a copolymer of an ethylenically unsaturated monomer selected from the group consisting of the C_3-C_{20} α-olefins, styrene, alkyl-substituted styrene, vinylbenzocyclobutane, 1,4-hexadiene, and naphthenics, and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 11,000;
b) a comonomer incorporation of greater than 30 mol percent;
c) a total crystallinity, as measured by DSC, of less than 5%; and
d) a pour point as measured by ASTM D97 of less than 25°C.

10. The pour-point reducing additive of Claim 7 wherein said homogeneous liquid low molecular weight ethylene/alpha-olefin polymer is a copolymer of an ethylenically unsaturated monomer which is a C_3-C_{20} α-olefin, and wherein the α-olefin is further selected from the group consisting of 1-propene, isobutylene, 1-butene, 1-hexene, 1-heptene, 4-methyl-1-pentene, and 1-octene; and wherein said polymer has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 9,000;
b) a comonomer incorporation of greater than 40 mol percent;
c) a total crystallinity, as measured by DSC, of less than 2%; and
d) a pour point as measured by ASTM D97 of less than 15°C.

11. The pour-point reducing additive of Claim 9 wherein said homogeneous liquid low molecular weight ethylene/alpha-olefin polymer is a copolymer of an ethylenically unsaturated is selected from the group consisting of propylene and 1-octene; and has;

a) a comonomer incorporation of greater than 50 mol percent; and
b) a pour point as measured by ASTM D97 of less than 0°C.

12. A synthetic oil for use as a lubricant oil comprising the liquid low molecular weight ethylene/alpha-olefin polymer of Claim 1, said oil having a kinematic viscosity at 100°C of 4 to 200 centistokes.

13. A homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer having;
a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 25,000;
b) a total crystallinity, as measured by DSC, of less than 50%; and
c) a pour point as measured by ASTM D97 of less than 90°C.

14. The homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer of Claim 13, wherein said polymer is a copolymer of ethylene and at least one comonomer selected from the group consisting of ethylenically unsaturated monomers, conjugated or nonconjugated dienes, and polyenes, and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 15,000;
b) a comonomer incorporation of greater than 10 mol percent;
c) a total crystallinity, as measured by DSC, of less than 40%; and
c) a pour point as measured by ASTM D97 of less than 80°C.

15. The homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer of Claim 13, wherein said comonomer is an ethylenically unsaturated monomer selected from the group consisting of the C_3-C_{20} α-olefins, styrene, alkyl-substituted styrene, vinylbenzocyclobutane, 1,4-hexadiene, and naphthenics, and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 11,000;
b) a comonomer incorporation of greater than 12 mol percent;
c) a total crystallinity, as measured by DSC, of less than 30%; and
d) a pour point as measured by ASTM D97 of less than 70°C.

16. The homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer of Claim 13, wherein the comonomer is an ethylenically unsaturated monomer which is a C_3-C_{20} α-olefin, and wherein the α-olefin is further selected from the group consisting of 1-propene, isobutylene, 1-butene, 1-hexene, 1-heptene, 4-methyl-1-pentene, and 1-octene; and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 9,000;
b) a comonomer incorporation of greater than 13 mol percent;
c) a total crystallinity, as measured by DSC, of less than 20%; and
d) a pour point as measured by ASTM D97 of less than 60°C.

17. The homogeneous gel-like low molecular weight ethylene/alpha-olefin polymers of Claim 16, wherein the comonomer is an ethylenically unsaturated is selected from the group consisting of propylene and 1-octene; and has;

a) a comonomer incorporation of greater than 15 mol percent; and
b) a pour point as measured by ASTM D97 of less than 40°C.

18. A process comprising reacting ethylene and at least one ethylenically unsaturated comonomer at a reaction temperature of at least 80°C in the absence of hydrogen and in the presence of a single site catalyst to form a homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer having;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 25,000;
b) a comonomer content of greater than 10 mol percent;
c) a total crystallinity, as measured by DSC, of less than 50%; and
d) a pour point as measured by ASTM D97 of less than 90°C.

19. A pour-point reducing additive comprising a homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer having;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 25,000;
b) a total crystallinity, as measured by DSC, of less than 50%; and
c) a pour point as measured by ASTM D97 of less than 90°C.

20. The pour-point reducing additive of Claim 19 wherein said homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer is a copolymer of ethylene and at least one comonomer selected from the group consisting of ethylenically unsaturated monomers, conjugated or nonconjugated dienes, and polyenes, and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 15,000;
b) a comonomer incorporation of greater than 10 mol percent;
c) a total crystallinity, as measured by DSC, of less than 40%; and
c) a pour point as measured by ASTM D97 of less than 80°C.

21. The pour-point reducing additive of Claim 19 wherein said homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer is a copolymer of ethylene and a comonomer wherein said comonomer is an ethylenically unsaturated monomer

selected from the group consisting of the C_3-C_{20} α-olefins, styrene, alkyl-substituted styrene, vinylbenzocyclobutane, 1,4-hexadiene, and naphthenics, and has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 11,000;
b) a comonomer incorporation of greater than 12 mol percent;
c) a total crystallinity, as measured by DSC, of less than 30%; and
d) a pour point as measured by ASTM D97 of less than 70°C.

22. The pour-point reducing additive of Claim 19 wherein said homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer is a copolymer of an ethylenically unsaturated monomer which is a C_3-C_{20} α-olefin, and wherein the α-olefin is further selected from the group consisting of 1-propene, isobutylene, 1-butene, 1-hexene, 1-heptene, 4-methyl-1-pentene, and 1-octene; and wherein said polymer has;

a) a number average molecular weight (Mn) as determined by gel permeation chromatography, of less than 9,000;
b) a comonomer incorporation of greater than 13 mol percent;
c) a total crystallinity, as measured by DSC, of less than 20%; and
d) a pour point as measured by ASTM D97 of less than 60°C.

23. The pour-point reducing additive of Claim 22 wherein said homogeneous gel-like low molecular weight ethylene/alpha-olefin polymer is a copolymer of an ethylenically unsaturated is selected from the group consisting of propylene and 1-octene; and has;

a) a comonomer incorporation of greater than 15 mol percent; and
b) a pour point as measured by ASTM D97 of less than 40°C.

24. A synthetic oil for use as a lubricant oil comprising the gel-like low molecular weight ethylene/alpha-olefin polymer of Claim 13, said oil having a kinematic viscosity at 100°C of 4 to 200 centistokes.